

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: WADDELL=1

In re Application of:	)	Art Unit: 3641
	)	
John L. WADDELL et al.	)	Examiner: STEPHEN JOHNSON
	)	
Appln. No.: 10/630,897	)	Washington, D.C.
	)	
Filed: July 31, 2003	)	Confirmation No. 9607
	)	
For: ACOUSTIC SHOCK WAVE	)	
ATTENUATING ASSEMBLY	)	

DECLARATION UNDER 37 CFR 1.132

Customer Service Window, Mail Stop Amendment  
Honorable Commissioner for Patents  
U.S. Patent and Trademark Office  
Randolph Building, Mail Stop  
401 Dulany Street  
Alexandria, VA 22314

Sir:

I, James Gordon, do hereby declare that I am one of the inventors of the above-identified application.

The above-identified application claims a blast attenuating assembly comprising a first film of flexible resin material and a second film of flexible resin material. The second flexible resin material has attached pockets spaced from each other along the second film. The first film of flexible material is attached to the second film via a plurality of seams, wherein the seams surround each pocket in such a manner as to make the assembly sufficiently flexible to surround any shaped structure. Each of the pockets is filed

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with a shock wave attenuating material having the flow properties of a liquid.

BlastGard International makes a product called BLASTWRAP® which is covered by the claims of the above-identified application. Appendix A describes BLASTWRAP®.

Appendix B describes sole source justification for BLASTWRAP® to be placed onto the GSA Advantage schedule, as Blastgard International is the only U.S. company that offers a bomb resistant trash receptacle. By way of information, these trash receptacles are lined with BLASTWRAP®.

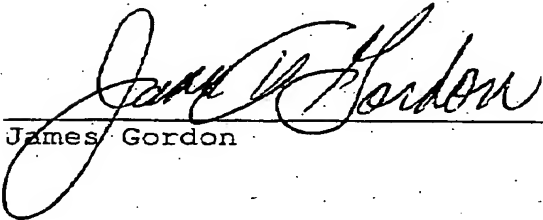
Appendix C is a copy of a letter from Mark Jannot, editor of *Popular Science* informing BlastGard International that BLASTWRAP® has been chosen to receive a 2005 Best of What's New Award from the magazine.

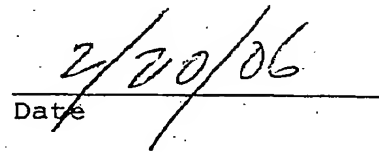
Appendix D is a draft of a report authored by Kevin Sharpe of how BLASTWRAP® can be used to protect pipelines from blast damage.

It is clear from the Appendices that BLASTWRAP® is a unique product that fulfills a long-felt need for blast attenuation.

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that all statements made on information and belief are

believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 81 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
James Gordon

  
Date



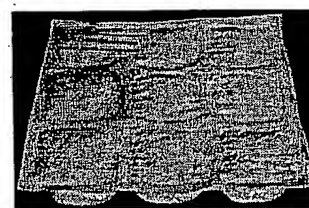
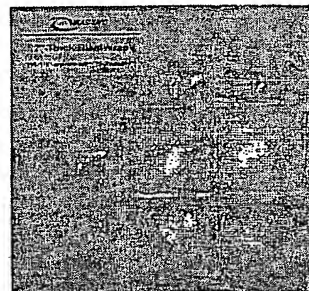
## WHAT IS BLASTWRAP®?

### Product Overview:

1. BlastWrap® is a unique, scientifically engineered, passive blast mitigation technology.
2. BlastWrap® is designed to remove most of the energy from explosions of all types, including high explosives, gas, dust and mist explosions.
3. BlastWrap® works by dissipating blast energy through irreversible processes while at the same time extremely rapidly quenching the blast fireball or flame front created as a result of an explosion.
4. BlastWrap® uses "COTS" attenuating materials, including fusible salts to quench the thermal output and two-phase volcanic materials to mechanically "smear" the shock, kill shock holing and dramatically reduce the blast impulse and pressures (incident and reflected pressure) of explosions.
5. BlastWrap® prevents sympathetic detonation, in which one explosion triggers another explosion, and another in a chain reaction that rapidly becomes a mass detonation.
6. BlastWrap® kills afterburn and, therefore, kills post-blast fires.
7. By marrying ballistic armor to the backside, BlastWrap® enhances the performance of all armor in fragment management.
8. BlastWrap® can be effectively used in confined and unconfined environments.
9. BlastWrap® products will save lives, reduce blast injuries and protect valuable assets.

### This unique Passive Mitigation system:

1. Works 7/24/365
2. Quenches blast thermal output, the fireball
3. Kills afterburn and post blast fires
4. Dramatically reduces blast impulse and pressure
5. Does not dispense chemical extinguishants
6. Uses no power, alarms, sensors, or activation systems
7. Is nontoxic and ecologically friendly
8. Is lightweight, flexible and easy to install
9. Is customizable and easy to install
10. Does not require maintenance
11. Does not create hazardous fragments
12. Never fails



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**Subject: Proposed Sole Source Justification to procure MTR 91 and MTR 101 mitigated trash receptacles.**

A survey of products being marketed through known literature, to include the GSA Advantage schedule, finds that BlastGard International, Inc. is the only U.S. Company which offers a bomb resistant trash receptacle which **mitigates the effects of bomb blast**. This blast mitigation is made possible by the integration of BlastWrap™, BlastGard International's unique, patent-pending blast mitigation technology.

There are four threats from an explosion inside a trash receptacle, each of which must be addressed and removed or significantly reduced if the public are to be given a meaningful level of protection. These four threats are:

- Primary fragmentation from materials in contact with the charge
- Secondary fragments from around the charge and pieces of the trash receptacle should it fail
- Blast overpressure
- Fireball

Accordingly, the following justification for sole source purchase is made based on:

- Unique Technology,
- Proven by extensive testing,
- Established Government pricing,
- Previous Government procurements, and
- Responsive delivery schedule

**1. Unique Technology** The MTR units are the only receptacles that deal with **all four** threats. Contrary to claims made by other manufacturers of trash receptacles, blast is not directed up and away from the unit and surrounding public but flows out at high velocity both vertically and horizontally, spreading outwards as an expanding hemispherical wave. This blast wave is potentially lethal, causing severe damage to the lungs, central nervous system, gastro-intestinal tract and the eardrums. If the explosion happens in an internal environment such as a subway, the blast wave is enhanced by reflections and its lethality is greatly increased. BlastGard's trash receptacles significantly reduce this threat by mitigating the blast pressures at source by up to 85%, from that which can cause fatal injuries to below the level that will generate physiological injury (at a few feet from the unit). Another important issue is that of the fireball. The fireball from a 12 lb TNT charge is nearly 20 feet in diameter and can cause third degree burns. The

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MTR trash receptacles extinguish the fireball in a few thousandths of a second and thereby dramatically reduce the potential for burns.

**2. Testing** The trash receptacle body is made from multiple steel layers and has been designed to withstand a detonation of twelve pounds of TNT for the MTR101 and four pounds for the MTR91. The units have been tested by independent US government organizations to meet and exceed the most stringent standards available today (the UK Home Office Scientific Development Bureau litter bin testing specification, both units have reached the top level for protection, ten stars). The units can withstand maximum charge detonation against the bottom and side wall welds. Patents or patents pending exist for all aspects of the unit.

**3. Established Government Pricing:** A negotiated price for GSA Advantage customers has been established by contract GS-07F-5769R, as amended by MO11, dated 5/20/05.

**4. Prior Government Procurements:**

- Department of Homeland Security - June 2005
- Washington Area Metro Transit Authority (WMATA) – June 2005
- Naval Research Laboratories – September 2005
- Amtrak –September 2005
- US Navy –Bahrain –September 2005
- Washington Area Metro Transit Authority (WMATA) December 2005 –reorder
- Amtrak –January 2006 – Re-order 204 MTR 101

**5. Responsive Delivery Schedule:** 60 days ARO – As reported in the GSA schedule. The vendor has also reported that drop shipments to various locations would be acceptable.

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September 28, 2005

Mike Graff  
Michael Gordon  
BlastGard International

To Mr. Graff and Mr. Gordon;

I'm pleased to inform you that the BlastWrap has been chosen to receive a 2005 Best of What's New Award from **POPULAR SCIENCE** in the General Innovation category.

Each year, we review thousands of new products and innovations and choose the top 100 winners across 12 categories for inclusion in our annual Best of What's New issue, our best-read issue of the year. To win, a product or technology must represent a significant step forward in its category. All of the winners will be featured in this December's special editorial section, on newsstands November 15.

In the coming months, you will receive your Best of What's New statuette celebrating this achievement. **In the meantime, please withhold any public announcement about your selection until Wednesday, November 9.**

Congratulations!

Sincerely,

Mark Jannot  
Editor

2 PARK AVENUE, 9<sup>TH</sup> FLOOR NEW YORK, NEW YORK 10016

**DRAFT**

# A new way to stay safe

Kevin Sharpe, Blastgard International, Inc., USA, explains the importance of pipeline security and presents a new technology for minimising pipeline damage from terrorism.

There is a network of approximately one million miles of oil pipelines in the world. A network that safely and efficiently supplies us with a commodity that is fundamental to our modern way of life, a system as essential as electric and telephone wires. Pipelines transport fuel for cars, trucks, planes and ships, the energy needed for inexpensive shipment of our factory products and for our mobile lifestyle. Pipelines also deliver the crude oil that refineries convert into essential materials for core industries such as plastics, pharmaceuticals and agriculture. These are a vital part of the global infrastructure and economy.

These pipelines often originate or are routed through areas of economic and political instability and have for many years been the targets of acts of economic terrorism in long wars of attrition. As the world becomes more reliant on oil and the price continues to rise, it is realistic to expect these acts of sabotage to become more frequent and more costly.

The Association of Oil Pipe Lines in the US has said that it is continuing to take action to protect these vital liquid pipelines from terrorist attacks, and in cooperation, oil pipeline companies have greatly increased their security measures since the terrorist attacks on the

World Trade Centre in 2001. These security measures include increased surveillance of pipelines, employee background checks, restricted access to pipeline facilities and satellite surveillance systems, new guard patrols, increased training and more coordination with relevant agencies to correspond with each increasing threat level. Studies show that more than 95% of oil pipeline operators have implemented security plans and field audits are conducted to assess operator security preparedness. Even in perhaps the best prepared country in the world where the various bodies involved in these activities have a wealth of experience, vulnerabilities remain.

The energy supply chain in the US is decentralised, which reveals both its strength and weakness. One incident of sabotage at any point in this web is unlikely to have a

substantial impact on the distribution system as a whole. The negative aspect of the system is that it is vulnerable to sustained or coordinated attacks. Its web-like nature renders total protection extremely difficult, and it is the explosiveness of the commodity in all forms that makes oil and gas infrastructure an attractive target. A devastating sabotage to this system would deal a psychological blow to the nation further inflamed by extensive media coverage.

Not all oil and gas transportation systems are as decentralised. Some countries route the majority of their fuel through a single pipeline, or choke point. These choke points are extremely vulnerable to sabotage and a single incident can produce significant negative economic effects.

There is some defense against the impact of this kind of economic terrorism. The oil industry prides itself on being able to rapidly repair damaged installations and return them to normal operations, but they clearly would struggle to meet the demands of sustained and organised terrorism aimed at vital elements of the energy system. Repair of individual oil line pipe sections is relatively straightforward, but attacks against pumping stations, valves, condensers, etc may be more difficult to overcome due to the limited availability of spares.

And it is these installations that are the very vulnerable portions of the system.

Oil and gas companies are reluctant to discuss their vulnerabilities or to say much about specific steps undertaken to accommodate a post 9/11 reality. Few want to underscore the reality that, outside of guns, gates and guards, physical options to protect the system are quite limited. The petroleum institute has pointed out that recent security measures do not incorporate new protective technology or designs but are instead, 'a new emphasis...a more systematic approach and a continuing re-evaluation' of individual company contingency plans in consultation with federal agencies. What is needed by these companies is a new technology that will integrate with existing security measures and offer meaningful protection against explosive sabotage.



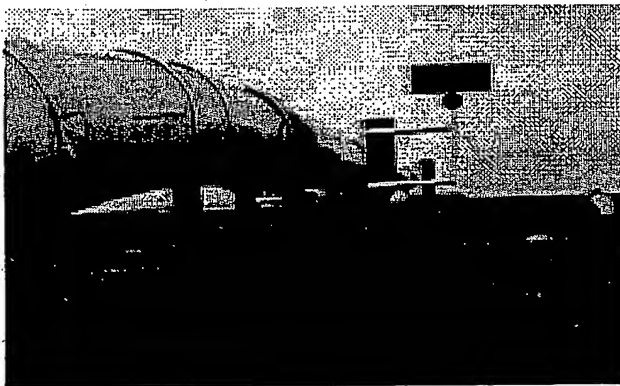


Figure 1. The Alyeska line.



Figure 2. Explosively formed hole in oil pipe.

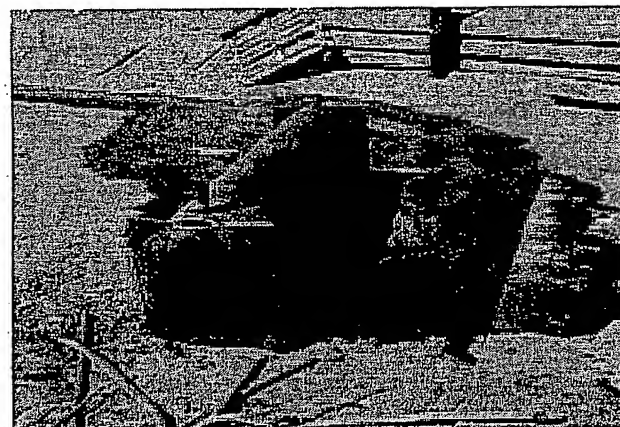


Figure 3. Hydraulic shock damage to welded end caps.

## Energy transportation infrastructure

The historical approach to security is detection and response, not deterrence or physical protection. Automated control systems will detect loss of pipeline pressure. Shutdown protocols are then activated to isolate the damaged area and repair teams are sent into the field; but, methods to protect the pipelines from such attacks are not in place.

Most oil and gas pipelines are routed underground, so in large part this historical approach may continue to work. Still, vital interconnections, compression, pigging or pumping stations are on the surface and are vulnerable. And there are large stretches of some pipelines that are routed above ground, like the Alyeska Line in Alaska (Figure 1).

Compressor stations to maintain pressure cost up to US\$ 40 million each and are located approximately every 60 miles on a pipeline. Pipelines are easily and quickly repaired but if these compressor stations, for instance, were targeted, the pipeline would be shut down for an extended period until replacements could be found. A lot of damage can be wrought by a few pounds of plastic explosive.

Like pipelines, oil refineries are crucial to the global energy infrastructure and make an obvious terrorist target. Refineries are complex process units and might be viewed through some sinister eyes as time bombs waiting to go off. They make a most attractive target to terrorist organizations.

In many cases, little more than a padlock and chain-link fence separates a saboteur from these assets. Consequently, hardening these sites is a key and ongoing task for pipeline owners. If these vital and valuable assets are to be protected, pipeline system nodes must be made more resistant to explosive devices. Materials technology is available, some of it transferred into the private sector from defense applications, but it has not yet been adopted by the oil and gas industry.

## Infrastructure vulnerability

It is extremely easy to severely damage pipelines with explosives. An in-contact plastic explosive charge will cut through even a filled oil pipeline without difficulty. The massive detonation pressures (approximately 210 kbars) produced by the explosive charge produce a high pressure wave in the wall of the pipe which totally over-matches the strength of the steel, punching a hole through the pipe wall. This damage on its own is significant, but if the contents are under considerable pressure, cracks can form and rapidly propagate along the axis of the pipe. Further damage is caused by the explosively generated high pressure wave that propagates through the pipe into the oil, setting up a hydraulic shock, which can produce significant damage remote from the site of the explosion. An event such as this on the Kirkuk pipeline costs the Iraqi people US\$ 7 million a day.

To assess the vulnerability of oil and gas pipelines to explosive attack, BlastGard International conducted a series of explosive tests at Bakersfield, CA. The tests graphically illustrate the phenomenon of high explosive breaching of oil pipelines and are described below.

The first test was conducted against a 24 in. OD steel line pipe with 3/8 in. wall thickness. The pipe had 3/8 in. thick caps welded on each end and the assembly was completely filled with water to replicate oil. A C4 uncased demolition charge was positioned against the side of the pipe and detonated. The charge punched a 6 in. diameter hole (Figure 2) through the side of the pipe allowing most of the contents to drain out.

The explosive blast had locally deformed the tube producing huge pressures and hydraulic shocks in the water filling the pipe. These pressures distorted the end caps and split the end welds (Figure 3).

## Protection of pipelines

Guards, fences and other onsite observation systems are commonly employed pipeline protection methods. As a result, the probability of an early detection of pipeline damage may be increased; however, it takes only seconds to place an explosive device on a pipeline and then disappear, so it is unlikely this approach will prevent attacks of sabotage.

The current security measures can be made much more effective by the deployment of a passive protection system, such as BlastWrap™, to protect oil pipelines and other vulnerable assets such as pressure vessels, fuel bunkers, electrical power and substations. BlastWrap™ products are made from two flexible films filled with a shock attenuating filler material blended with a fire extinguishant. The material offers a revolutionary blast protection system against all blast and fire/burn threats. BlastWrap™ (Figure 4) not only substantially reduces blast impulse and pressure, but quenches fireballs and suppresses post-blast fires. BlastWrap™ dissipates substantial portions of blast energy through irreversible mechanical processes, and these results are accomplished passively, without dispersal of agents (foam or powder), without sensors and without the need for power.

As a demonstration of the protective power of BlastWrap™ the previous test was repeated except only a three inch thick layer of BlastWrap™ was used between an identical section of pipe and the C4 demolition charge. The charge did not penetrate the pipe or cause any leakage or remote damage (Figure 5).

Uncased demolition charges made from plastic explosive or nitroglycerin based commercial explosives like Dynamite are commonly used against oil and gas pipelines throughout the world. BlastWrap™, as demonstrated, works extremely well against this kind of threat.

Unfortunately, due to the availability of large quantities of military ordnance, the threat to pipelines in Iraq is much more severe.

Figure 6 shows an unsophisticated improvised explosive device (IED) comprising a 122 or 130 mm artillery shell wired to mechanical timing device in this case a simple alarm clock.

This is a commonly used device in Iraq and this one was discovered in the Kabbaz Field, Northern Iraq. The IED has been attached to a 'Christmas tree' or well head. Note the plastic bottle filled with gasoline to enhance probability of well fire on detonation. The presence of fire makes repair even more costly and difficult. This simple device delivers a severe blast and fragmentation threat to a very valuable and difficult to repair target. BlastGard have been working to develop ways of protecting pipelines and oil installations against attack with IEDs consisting of fragmenting munitions. The protection system that has been developed to meet this threat consists of a light weight armor combined with BlastWrap™. It is important that a light weight armor is used rather than steel plate as steel is turned into highly damaging, high velocity fragmentation when driven by an in contact charge. The light weight armor does not contain Kevlar or any of the other difficult to obtain anti-ballistic fibres and the cost is similar to that of steel but is half the

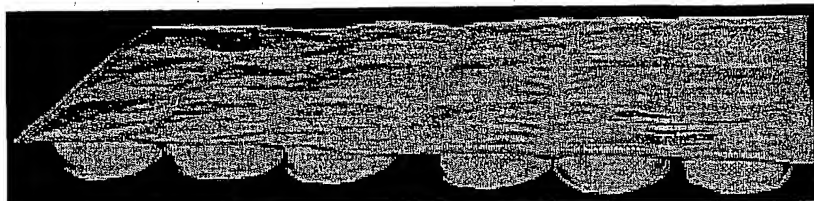


Figure 4. 3 in. thick BlastWrap™.



Figure 5. Slight indentation in pipe and no leakage.



Figure 6. Photo showing artillery shell placed on wellhead alarm valve.

weight. The armor is applied to stop the fragmentation and the BlastWrap™ deals with the blast, shock holing and fireball threat. The combination is based on a system that has been developed to protect HMMWV military vehicles from IEDs that use the powerful 155mm artillery shell. This is an ideal and cost effective solution to the IED threat being applied in Iraq.

## Summary

BlastWrap™ is the solution to explosive sabotage of oil pipelines. The unique blast mitigation capability is the missing link in the pipeline security systems. It offers protection against airblast and particularly the worst case scenario, in-contact charges and, in combination with a light weight armour, neutralises the threat from fragmenting munitions. BlastWrap™ can be rapidly retro-fitted to existing pipelines and is an inexpensive solution, especially in view of the costs of lost oil production and installation

repairs.

BlastWrap™ is an excellent thermal insulator and can be used to lag pipes. It is low density and adds little weight to a system. A single outer wrap material is required to ensure that the protective material is not easily identified by and/or removed by attackers. Commonly used aluminium sheet outer wrapping, that can be seen on the pipeline in Figure 1, is ideal.

**DRAFT**

**DRAFT**



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## **BlastGard International Named 2005 Technology Innovation Award Winner by Aviation Week**

Clearwater, FL November \_\_, 2005 – BlastGard International's, (OTCBB:BLGA), BlastWrap® technology has been named a recipient of Aviation Week Magazine's 2005 Technology Innovation Award. BlastGard was one of only five recipients of the publication's annual award highlighting innovation in aerospace and defense technology. The award will be presented at Aviation Week's conference taking place this week in Phoenix Arizona. This year's conference is focusing on the issues most critical to those working in Aviation where exploration, innovation, and invention meet head-on with the realities of national defense, transportation and security.

BlastWrap® technology is a product that is designed to mitigate blasts and suppress blast thermal output and the ensuing fires from blasts and explosions, regardless of the material or compound that causes the explosion. BlastWrap® is configurable and consists of two flexible films arranged one over the other and joined together by a plurality of seams filled with volcanic glass beads and an extinguishant that offers a revolutionary protection system against blast and fire/burn threats. BlastWrap® can be wrapped around or conform to any shape, and it is being used in applications such as trash receptacles, oil pipelines, transportation vehicles etc.

"We are extremely proud that our BlastWrap® technology has been recognized by Aviation Week, a highly acclaimed industry trade publication. We believe that as BlastWrap® becomes known in the marketplace, it will revolutionize the way the world's governments and private industries deal with threats from explosive devices. BlastWrap® is designed to work in conjunction with different applications in a variety of market sectors to reduce the damage caused by explosions in a uniquely effective manner," said James Gordon CEO and founder of BlastGard International.

### **About BlastGard International, Inc.**

BlastGard International, Inc. creates, designs, develops, manufactures and markets proprietary blast mitigation materials. The Company's patent-pending BlastWrap® technology effectively mitigates blast effects and suppresses post-blast fires. This unique technology can be used to create new, finished products or be used to retrofit to existing products. While the need for this technology has always been present, the security and safety concerns resulting from the September 11, 2001 acts and the subsequent development of Homeland Security make the timing of the Company's emergence even more important. The Company's core market focus is on blast effects mitigation for the commercial sector, military, law enforcement and government agencies. BlastWrap® is based upon well-defined principles and suppresses blast pressures by 50% or more. BlastWrap® products are made from two flexible films arranged one over the other and joined by a

plurality of seams filled with attenuating filler material (volcanic glass bead or other suitable two-phase materials), configurable (designed for each application) with an extinguishing coating that offers a revolutionary blast protection system against Blast & Fire/burn threats. BlastWrap® is a blast mitigation assembly that can be wrapped around or conform to any shape. BlastWrap® is a concept (not a chemical compound) from which blast protection products are built to save lives and reduce damage to valuable assets from explosions. Additional information on BlastGard can be found at <http://www.blastgardintl.com>.

*"Safe Harbor" statement under the Private Securities Litigation Reform Act of 1995: Except for historical information, all of the statements, expectations and assumptions contained in the foregoing are forward-looking statements that involve a number of risks and uncertainties. It is possible that the assumptions made by management are not necessarily the most likely and may not materialize. In addition, other important factors that could cause actual results to differ materially include the following: the Company's ability to market its products; the Company's ability to obtain additional funding; the Company's ability to obtain regulatory approvals on new products, the general economy; competitive factors; ability to attract and retain personnel; the price of the Company's stock; and other risk factors. The Company takes no obligation to update or correct forward-looking statements.*

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